

REMARKS

Applicants have carefully reviewed the Office Action dated December 21, 2010, and thank the Examiner for the detailed review of the pending claims. Applicants have amended claim 2 to move certain limitations from the preamble to the body of claim 2 and to further clarify the scope of previously recited “hardenable steel” within the scope of the present application. By way of this amendment, no new matter has been added. Support for this amendment may be found, at least, in paragraph [0002] of the specification as filed. Claims 1, 3 – 13, 15, 17 and 19 were previously cancelled. Accordingly claims 2, 14, 16, 18 and 20 – 30 remain pending in this application. At least for the reasons set forth below, Applicants respectfully traverse the foregoing rejections.¹

Claim Rejections – 35 U.S.C. § 112

Claim 2 was rejected under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the written description requirement. Applicants have amended claim 2 to remove the recitation “without a filler” thereby rendering the rejection moot. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claim Rejections – 35 U.S.C. § 103

I. The Law:

"To establish prima facie obviousness of a claimed invention, all the claim recitations must be taught or suggested by the prior art." *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). M.P.E.P. § 2143.03. Accord. M.P.E.P. § 706.02(j).

¹ As Applicants' remarks with respect to the Examiner's rejections are sufficient to overcome these rejections, Applicants' silence as to assertions by the Examiner in the Office Action or certain requirements that may be applicable to such rejections (e.g., whether a reference constitutes prior art, motivation to combine references, assertions as to dependent claims, etc.) is not a concession by Applicants that such assertions are accurate or such requirements have been met, and Applicants reserve the right to analyze and dispute such assertions/requirements in the future. Further, for any instances in which the Examiner took Official Notice in the Office Action, Applicants expressly do not acquiesce to the taking of Official Notice, and respectfully request that the Examiner provide an affidavit to support the Official Notice taken in the next Office Action, as required by 37 CFR 1.104(d)(2) and MPEP § 2144.03. Applicants respectfully request reconsideration of the present application in view of the above amendment and the following remarks.

“The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant’s disclosure.” *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). “It can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way that the claimed invention does.” *KSR Int’l v. Teleflex, Inc.*, 127 S.Ct. 1727, 1741 (2007).

II. Clarke in view of Brenner and Araki with evidence from Coleman

Claims 2, 14, 16, and 18 – 26 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,211,327 to Clarke et al. (hereinafter, “Clarke”) in view of U.S. Patent No. 6,365,866 to Brenner et al. (hereinafter, “Brenner”) and U.S. Patent No. 4,020,312 to Araki et al. (hereinafter, “Araki”) with evidence from U.S. Publication No. 2003/0017356 to Coleman et al. (hereinafter, “Coleman”). Applicants respectfully traverse the rejection.

Independent claim 2, as amended, recites in part: “[a] process for joining components for torque transmission in a vehicle, by producing a weld seam, comprising: providing hardenable steel components having a material thickness and a carbon content of over 0.2%... supplying a plasma gas... melting the steel in the vicinity of the weld line over the entire material thickness, wherein the energy per unit length introduced by the welding process is in the range from 234 J/mm to 3360 J/mm, wherein the hardenable steel has a material thickness in the range from approximately 2.0 mm to 10.0 mm wherein a weld seam is produced, at the weld line, without secondary heating.” These features are not taught or shown in the cited references, alone or in combination.

A. The Clarke/Brenner/Araki combination fails to teach a welding process using a plasma gas at a energy per unit length in the range from 234 J/mm to 3360 J/mm

Applicants respectfully assert that the prior art of record neither discloses nor suggests each element of independent claim 2, and as such, the rejection is in conflict with the rule of *In re Royka*. The Examiner admitted that Clarke fails to teach an “energy per unit length... is in the range from 234 J/mm to 3360 J/mm and the steel thickness being 2.0 mm to 10.0 mm,” but stated that Brenner teaches “the parts have a 3.0 mm thickness” and that Araki “teaches... a welding current of 1500A and an arc voltage 36V for a power of 54kW at 300mm – 1500mm per minute for an energy per unit length of 2351.7 J/mm at 1.4m/min. (P=IV and 54kW*43.55J/mm).” *See Office Action, page 4.* In

view of this position, the Examiner alleged that it would have been obvious to adapt Clarke in view of Brenner and Araki to provide the claimed welding energy and the material thickness. *See Office Action, page 4.* Applicants respectfully disagree.

Araki fails to make up for the admitted deficiencies of Clarke and Brenner. Specifically, Araki teaches a process for welding steel pipes through a single or multi electrode MAG-welding system utilizing CO₂ shielding. *See, at least, Araki, Col. 3, line 67 – Col. 4, line 15.* Additionally, as admitted by the Examiner, Araki teaches “an energy per unit length of 2351.7 J/mm at 1.4m/min *for a CO₂ MAG-welding process.*” *See Office Action, page 4* (emphasis added).

However, Applicants direct the Examiner’s attention to paragraph [0025] of Applicants’ specification, which specifically recites that, in the case of plasma keyhole welding, the energy per unit length is preferably in a range which is **at least a factor of four higher than in the case of a CO₂ laser at the same welding speeds.** Thus, as recited in independent claim 2, *the claimed plasma gas welding process* utilizes an “energy per unit length... is in the range from 234 J/mm to 3360 J/mm,” which if converted to a CO₂ welding process, would equate to approximately 59 J/mm to 840 J/mm.

Accordingly, Araki’s 2351.7 J/mm energy per unit length for the CO₂ process would equate to approximately 9407 J/mm for a plasma welding process, as expressly recited within claim 2, which is well outside the range recited within independent claim 2. This large energy per unit length calculation far exceeds and importantly falls out of Applicants’ claimed range. Therefore, because Araki teaches a CO₂ welding process having an energy per unit length that would be calculated to approximately 9407 J/mm when a plasma gas is used, Araki cannot make up for the deficiencies discussed above. Accordingly, Clarke, Brenner, and Araki, individually or in combination, fail to teach or suggest, at least, *a plasma welding process* where the “energy per unit length is 234 J/mm to 3369 J/mm,” as recited within the context of claim 2.

B. Coleman teaches welding aluminum or titanium and fails to teach a welding process for welding steel using a plasma gas at an energy per unit length in the range from 234 J/mm to 3360 J/mm and therefore would not be combined as alleged

In the Office Action, the Examiner alleged that Coleman shows a comparable welding process that may be performed through the entire thickness. Applicants respectfully disagree. Coleman's disclosed *aluminum* welding process cannot be compared to or combined with processes for welding steel. Specifically, Coleman cannot be combined with or make up for the deficiencies of Clarke, Brenner, and Araki, because Coleman also fails to teach or suggest, at least, ***a plasma welding process*** where the "energy per unit length is 234 J/mm to 3369 J/mm" is used to weld ***hardenable steel***, i.e., steel having a carbon content of over 0.2%, as recited within the context of claim 2.

Instead, Coleman teaches a method of manufacturing a structural assembly made to join first and second aluminum or titanium based structural members by irradiated them with a high-energy electron beam or laser along the interface to consume the weld land and join the two members. *See Abstract*. As the Examiner (as well as one of ordinary skill in the art) can appreciate, there are many different parameters used in welding based on the materials, and the differences do not afford one of skill in the art the option of simply cross utilizing a parameter for steel when welding aluminum. Indeed, it is known that the welding temperature of aluminum (approximately 660 °C) is approximately half of the welding temperature of steel (approximately 1350 °C), while the coefficient of expansion of aluminum is considerably higher (23.6) than that of steel (12.6). *See Lincoln Electric, www.lincolnelectric.com*. Accordingly, one would not look to the parameters of an aluminum welding process for a hardenable steel welding process. Thus, because the melting temperature's coefficient of expansion is approximately two times greater in steel welding versus aluminum welding, the two processes cannot be combined. Therefore, Clarke, Brenner, Araki and Coleman cannot be combined.

C. The cited references fail to teach or suggest producing a weld seam over the entire thickness of a hardenable steel component having a carbon content of over 0.2% without secondary heating

Nowhere does Clarke, Brenner, Araki and Coleman, individually or in combination, teach or suggest producing a weld seam over the entire thickness of a hardenable steel having a carbon content of over 0.2% using a plasma gas and an energy per unit length in the range from 234 J/mm

to 3360 J/mm without the use of secondary heating, as recited within the context of claim 2. Within the context of this application, the phrase “hardenable steel” was expressly defined as having a carbon content of over 0.2%. *See, e.g.*, paragraph [0002]. To clarify claim 2, Applicant’s have amended claim 2 to expressly include this definition. However, because the recited combination fails to include this limitation, the rejection is in conflict with the rule of *In re Royka*.

Clarke teaches that hardenable steels may be welded, but refers, in this respect, to **low carbon alloy steels**, such as 16 MnCr5, which has a carbon content of only 0.16%. *See Clark, Col. 5, line 46*. Thus, Clarke fails to teach or suggest a carbon content of 0.2% or greater as expressly recited within the context of claim 2. Brenner teaches that such carbon steels and low-alloy steels are only weldable to a limited extent by commercial means, as the increased hardening in the welding and heat affected zone caused by the carbon results in cracks, which Brenner solves by providing an intensive preheating of the components. *See Brenner, Col. 1, lines 23 – 44 and Claim 1*. Thus, Brenner also fails to teach or suggest a carbon content of 0.2% or greater as recited within the context of claim 2. Araki teaches welding low temperature high strength steel pipes with electrode welding, refers to weld material with a carbon equivalent above 0.5 and proposes post heat treating. *See Araki, Col. 3, line 46 to Col. 4, line 25*. Additionally, regarding this carbon equivalent, it is to be pointed out that this value can be obtained by the equation provided at Col. 4, line 35. Thus, based on the equation, Araki teaches that only carbon steels with an upper limit of the carbon content of 0.15% can be used for the proposed process. Importantly, Araki states that any excessive increase in the carbon content **above 0.15%**, as expressly recited in claim 2, results in sharp deterioration of the toughness in the base metal and the welding heat affected zone as well, and the maximum hardness is also increased. *See Araki Col. 6, lines 4 – 15*. Thus, because Araki teaches a 0.15% maximum carbon content, Araki fails to teach a carbon content over 0.2% and actually **teaches away** from such a percentage. Moreover, nowhere does Coleman teach a process where a hardenable steel is providing having a carbon content of over 0.2%, supplying a plasma gas and melting the entire material thickness of the hardenable steel at a range from 234 J/mm to 3360 J/mm, as recited within the context of claim 1. Therefore, Clarke, Brenner, Araki and Coleman, individually or in combination, fail to teach or suggest the recitations of claim 2.

Accordingly, Brenner, Araki and Coleman all fail to make up for the admitted deficiencies of Clarke and as such the combination does not teach every recitation of amended independent claim 2, as required by *In re Royka*. For at least this reason, claim 2 is allowable over the recited combination. Furthermore, dependent claims 14, 16, 18 and 20 – 26, being dependent upon independent claim 2, are patentable by virtue of their dependency upon allowable independent claim 2. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

III. Clarke as modified by Brenner and Araki and further in view of Kehrer

Claims 27 – 30 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Clarke as modified by Brenner and Araki and further in view of U.S. Publication No. 2004/0136776 to Kehrer (hereinafter, “Kehrer”). Applicants respectfully traverse the rejection.

Claims 27 – 30 are dependent on claim 2. The remarks presented above with respect to the § 103 rejection are equally applicable here. Specifically, the inadequacy of the combination of Clarke, Brenner and Araki to teach every element of independent claim 2 by not teaching any type of welding process “wherein the energy per unit length introduced... is in the range from 234 J/mm to 3360 J/mm” as recited by Applicants’ independent claim 2 is also fatal to the Examiner’s § 103 rejection.

Nor does Kehrer make up for the deficiencies of Clarke, Brenner and Araki. More specifically, while Kehrer is directed to the welding of vehicle parts such as transmissions, wherein these parts are made from hardenable steel and are joined by plasma welding, Kehrer does not disclose any welding process “[a] process for joining components for torque transmission in a vehicle, by producing a weld seam, comprising: providing hardenable steel components having a material thickness and a carbon content of over 0.2%... supplying a plasma gas... melting the steel in the vicinity of the weld line over the entire material thickness, wherein the energy per unit length introduced by the welding process is in the range from 234 J/mm to 3360 J/mm, wherein the hardenable steel has a material thickness in the range from approximately 2.0 mm to 10.0 mm wherein a weld seam is produced, at the weld line, without secondary heating” as claimed by Applicants’ independent claim 2. Therefore, the combination of Clarke, Brenner, Araki and Kehrer

does not teach every recitation of independent claim 2. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

Conclusion

In view of the above amendment and remarks, the pending application is in condition for allowance. If, however, there are any outstanding issues that can be resolved by telephone conference, the Examiner is earnestly encouraged to telephone the undersigned representative.

It is believed no fees are due with this response. However, if any fees are required in connection with the filing of this paper that are not identified in any accompanying transmittal, permission is given to charge our Deposit Account No. 18-0013, under Order No. 66969-0003 from which the undersigned is authorized to draw. To the extent necessary, a petition for extension of time under 37 C.F.R. §1.136 is hereby made, the fee for which should also be charged to this Deposit Account.

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Respectfully submitted,

(the 21st being a federal holiday)

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